MATHEMATICS FOR CHEMISTRY

POWERS, RECIPROCALS & ROOTS

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As the power is reduced by 1 (e.g. from 4 to 3), the value is divided by 2 (the base), i.e. 16 goes to 8. This pattern continues leading to negative powers.
Note that POWERS are also referred to as EXPONENTS or INDICES
Powers as Fractions and Fractions as Powers

As the power is reduced by 1 (e.g. from 4 to 3), the value is divided by 10 (the base), i.e. 10,000 goes to 1,000. This pattern continues leading to negative powers.

<table>
<thead>
<tr>
<th>$10^{-4}$</th>
<th>$10^{-3}$</th>
<th>$10^{-2}$</th>
<th>$10^{-1}$</th>
<th>$10^{0}$</th>
<th>$10^{1}$</th>
<th>$10^{2}$</th>
<th>$10^{3}$</th>
<th>$10^{4}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0001</td>
<td>0.001</td>
<td>0.01</td>
<td>0.1</td>
<td>1</td>
<td>10</td>
<td>100</td>
<td>1,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>
MULTIPLYING POWERS

\[ x^a \times x^b = x^{(a+b)} \]
DIVIDING POWERS

\[ \frac{x^a}{x^b} = x^a \times x^{-b} = x^{(a-b)} \]
POWER OF POWERS

\[(x^a)^b = x^{ab}\]
\[ x^a \times x^b = x^{(a+b)} \]
\[ \frac{1}{x^a} = x^{-a} \]
\[ \frac{x^a}{x^b} = x^a \times x^{-b} = x^{(a-b)} \]
\[ (x^a)^b = x^{ab} \]
\[ x^0 = 1 \]